

Amendments to the Specification:

1. (Currently Amended) A computerized method of optimizing properties of a magnetic core, the core having inner and outer radii and windings, the computerized method having computer-executable instructions for performing the following:

- a) allowing the inner and outer core radii to change parametrically in a nested loop;
- b) computing core reluctance, number of turns, and winding resistance for each position, wherein the core reluctance is computed using a boundary element analysis for the core, wherein the core is assumed to have a one-turn inductance;

c) computing a maximum induced membrane voltage based on the following equation:

$$V_m(t) = f \sqrt{\frac{2W}{\Re}} \omega \tau_L (4\omega^2 \tau_L^2 - 1) \cdot \left(\frac{e^{-\frac{t}{2\tau_L}} \cos(\beta) + \frac{e^{-\frac{t}{2\tau_L}} (2\tau_L \tau_m \omega^2 - 1) \sin(\beta)}{\sqrt{4\omega^2 \tau_L^2 - 1}} - e^{-\frac{t}{\tau_m}}}{4\omega^4 \tau_m^2 \tau_L^3 + \omega^2 (4\tau_L^3 - \tau_m^2 \tau_L) + (\tau_m - \tau_L)} \right);$$

$$\text{where } \beta \equiv \frac{1}{2} \sqrt{\frac{4\omega^2 \tau_L^2 - 1}{\tau_L^2}} t.$$

- d) fitting the maximum induced membrane voltage to the inner and outer core radii using a multi-variable spline analysis; and
- e) using a variable metric sequential quadratic program algorithm to compute a value for the inner and outer core radii that maximizes the maximum induced membrane voltage.

2. (Original) A method according to Claim 1 further comprising the step of:

- f) repeating step e) with a Monte-Carlo starting guess algorithm, wherein said step f) insures that a global maximum is found.

3. (Original) A method according to Claim 1, wherein said method is performed with a preselected wire size.

4. (Original) A method according to Claim 1, further comprising the initial step of selecting a wire size.

5. (Original) A method according to Claim 2, further comprising the initial step of selecting a wire size.

6. (Previously Presented) A method according to Claim 4, further comprising the steps of:

- g) selecting different wire sizes, and
- h) repeating steps a-e for each different wire size selected.

7. (Original) A method according to Claim 5, further comprising the steps of:

- g) selecting different wire sizes, and
- h) repeating steps a-f for each different wire size selected.

8. (Original) A method according to Claim 6, further comprising the step of:

- i) selecting the wire size which maximizes the membrane voltage.

9. (Original) A method according to Claim 7, further comprising the step of:

- i) selecting the wire size which maximizes the membrane voltage.

10. (Canceled).

11. (Previously Presented) A method according to Claim 1, further comprising manufacturing a magnetic core.